DCCUMENT RESUME

ED 036 446 24 SE 007 896

AUTHOF BUCHANAN, ANNE E.; AND OTHERS
TITLE EFFECTS OF INCREASED HOME-SCHOOL CONTACT ON PERFORMANCE AND ATTITUDES IN MATHEMATICS.
INSTITUTION WISCONSIN UNIV., MADISON. RESEARCH AND DEVELOPMENT CENTER FOR COGNITIVE LEARNING.
SPONS AGENCY OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C. BUREAU OF RESEARCH.
REPORT NO TR-89
BUREAU NO BR-5-0216
PUB DATE JUN 69
CONTRACT OEC-5-10-154
NOTE 10P.

EDRS PRICE EDRS PRICE MF-$0.25 HC-$0.60
DESCRIPIORS *ACHIEVEMENT, *ATTITUDES, *ELEMENTARY SCHOOL MATHEMATICS, GRADE 2, HIGH ACHIEVERS, LOW ACHIEVERS, *MATHEMATICS, *PARENT TEACHER CONFERENCES, RESEARCH

ABSTRACI

REPORTED IS A STUDY TO DETERMINE THE INFLUENCE OF INCREASED HOME-SCHOOL CONTACI ON CHILDREN'S PERFORMANCE AND ATTITUDES IN MATHEMATICS. SINGLE AND CCMBINED EFFECTS OF FREQUENT PARENT-TEACHER CONFERENCES AND OF HOMEWORK WERE STUDIED. S'S WERE 83 SECOND-GRADE STUDENTS FROM THREE ARITHMETIC CLASSES REPRESENTING HIGH, MEDIUM, AND LCW ACHIEVERS. WITHIN EACH ACHIEVEMENT LEVEL GROUP, S'S WERE RANDCMLY ASSIGNED TO ONE OF THREE EXPERIMENTAL GROUPS (CONFERENCE-HCMEWORK, CONFERENCE, HOMEWCRK) OR TO A CONTROL GROUP. PARENTS OF SS IN THE CCNFERENCE-HCMEWORK GROUP PARTICIPATED IN PARENT-TEACHER CONFERENCES EVERY CTHER WEEK FOR 12 WEEKS AND RECEIVED HOMEWORK ASSIGNMENTS FOR THE SS. PARENTS OF SS IN THE CONFERENCE GROUP ATTENDED SIMILAR CONFERENCES BUT WERE NOT GIVEN HOMEWORK FOR THE SS. SS IN THE HOMEWORK GROUP RECEIVED HOMEWORK ASSIGNMENTS BUT THEIR PARENTS DID NOT ATTEND CONFERENCES. AMONG RESULTS REPORTED WERE (1) HCMEWORK FACILITATED PERFORMANCE OF LOW-AND HIGH-ACHIEVING SS ON THE PCSTTEST, WHEREAS IT HAD THE OPPOSITE EFFECT ON HIGH-ACHIEVING SS, AND (2) HIGH-ACHIEVING SS SHOWED A STRONG NEGATIVE CHANGE IN ATTITUDE, AVERAGE-ACHIEVING SS A SOMEWHAT LESS NEGATIVE CHANGE, AND LOW-ACHIEVING SS A SLIGHT POSITIVE CHANGE. (RP)

ED036446

BR 5-0216 TR 89
PA-24
OE/BR

Technical Report No. 89

EFFECTS OF INCREASED HOME-SCHOOL CONTACT ON PERFORMANCE AND ATTITUDES IN MATHEMATICS

By Anne E. Buchanan, Patricia J. Hansen,
and Mary R. Quilling

Report from the Project on Situational Variables
and Efficiency of Concept Learning
Herbert J. Klausmeier, Principal Investigator

Wisconsin Research and Development
Center for Cognitive Learning
The University of Wisconsin
Madison, Wisconsin

June 1969

SE 007 896

Published by the Wisconsin Research and Development Center for Cognitive Learning, supported in part as a research and development center by funds from the United States Office of Education, Department of Health, Education, and Welfare. The opinions expressed herein do not necessarily reflect the position or policy of the Office of Education and no official endorsement by the Office of Education should be inferred.

Center No. C-03 / Contract OE 5-10-154

NATIONAL EVALUATION COMMITTEE

Samuel Brownell
Professor of Urban Education
Graduate School
Yale University

Henry Chauncey
President
Educational Testing Service

Elizabeth Koontz
President
National Education Association

Patrick Suppes
Professor
Department of Mathematics
Stanford University

Launor F. Carter
Senior Vice President on Technology and Development
System Development Corporation

Martin Deutsch
Director, Institute for Developmental Studies
New York Medical College

Roderick McPhee
President
Punahou School, Honolulu

***Benton J. Underwood**
Professor
Department of Psychology
Northwestern University

Francis S. Chase
Professor
Department of Education
University of Chicago

Jack Edling
Director, Teaching Research Division
Oregon State System of Higher Education

G. Wesley Sowards
Director, Elementary Education
Florida State University

UNIVERSITY POLICY REVIEW BOARD

Leonard Berkowitz
Chairman
Department of Psychology

John Guy Fowlkes
Director
Wisconsin Improvement Program

Herbert J. Klausmeier
Director, R & D Center
Professor of Educational Psychology

M. Crawford Young
Associate Dean
The Graduate School

Archie A. Buchmiller
Deputy State Superintendent
Department of Public Instruction

Robert E. Grinder
Chairman
Department of Educational Psychology

Donald J. McCarty
Dean
School of Education

***James W. Cleary**
Vice Chancellor for Academic Affairs

H. Clifton Hutchins
Chairman
Department of Curriculum and Instruction

Ira Sharkansky
Associate Professor of Political Science

Leon D. Epstein
Dean
College of Letters and Science

Clauston Jenkins
Assistant Director
Coordinating Committee for Higher Education

Henry C. Weinlick
Executive Secretary
Wisconsin Education Association

EXECUTIVE COMMITTEE

Edgar F. Borgatta
Brittingham Professor of Sociology

Russell J. Hosler
Professor of Curriculum and Instruction and of Business

Wayne Otto
Professor of Curriculum and Instruction (Reading)

Richard L. Venezky
Assistant Professor of English and of Computer Sciences

Max R. Goodson
Professor of Educational Policy Studies

***Herbert J. Klausmeier**
Director, R & D Center
Professor of Educational Psychology

Robert G. Petzold
Associate Dean of the School of Education
Professor of Curriculum and Instruction and of Music

FACULTY OF PRINCIPAL INVESTIGATORS

Ronald R. Allen
Associate Professor of Speech and of Curriculum and Instruction

Gary A. Davis
Associate Professor of Educational Psychology

Max R. Goodson
Professor of Educational Policy Studies

Richard G. Morrow
Assistant Professor of Educational Administration

Vernon L. Allen
Associate Professor of Psychology
(On leave 1968-69)

M. Vere DeVault
Professor of Curriculum and Instruction (Mathematics)

Warren O. Hagstrom
Professor of Sociology

Wayne Otto
Professor of Curriculum and Instruction (Reading)

Nathan S. Blount
Associate Professor of English and of Curriculum and Instruction

Frank H. Farley
Assistant Professor of Educational Psychology

John G. Harvey
Associate Professor of Mathematics and Curriculum and Instruction

Milton O. Pella
Professor of Curriculum and Instruction (Science)

Robert C. Calfee
Associate Professor of Psychology

John Guy Fowlkes (Advisor)
Professor of Educational Administration
Director of the Wisconsin Improvement Program

Herbert J. Klausmeier
Director, R & D Center
Professor of Educational Psychology

Thomas A. Romberg
Assistant Professor of Mathematics and of Curriculum and Instruction

Robert E. Davidson
Assistant Professor of Educational Psychology

Lester S. Golub
Lecturer in Curriculum and Instruction and in English

Burton W. Kreitlow
Professor of Educational Policy Studies and of Agricultural and Extension Education

Richard L. Venezky
Assistant Professor of English and of Computer Sciences

MANAGEMENT COUNCIL

***Herbert J. Klausmeier**
Director, R & D Center
Acting Director, Program 1

Thomas A. Romberg
Director
Programs 2 and 3

James E. Walter
Director
Dissemination Section

Dan G. Woolpert
Director
Operations and Business

Mary R. Quilling
Director
Technical Section

* COMMITTEE CHAIRMAN

STATEMENT OF FOCUS

The Wisconsin Research and Development Center for Cognitive Learning focuses on contributing to a better understanding of cognitive learning by children and youth and to the improvement of related educational practices. The strategy for research and development is comprehensive. It includes basic research to generate new knowledge about the conditions and processes of learning and about the processes of instruction, and the subsequent development of research-based instructional materials, many of which are designed for use by teachers and others for use by students. These materials are tested and refined in school settings. Throughout these operations behavioral scientists, curriculum experts, academic scholars, and school people interact, insuring that the results of Center activities are based soundly on knowledge of subject matter and cognitive learning and that they are applied to the improvement of educational practice.

This Technical Report is from the Situational Variables and Efficiency of Concept Learning Project in Program 1. General objectives of the Program are to generate new knowledge about concept learning and cognitive skills, to synthesize existing knowledge, and to develop educational materials suggested by the prior activities. Contributing to these Program objectives, the Concept Learning Project has the following five objectives: to identify the conditions that facilitate concept learning in the school setting and to describe their management, to develop and validate a schema for evaluating the student's level of concept understanding, to develop and validate a model of cognitive processes in concept learning, to generate knowledge concerning the semantic components of concept learning, and to identify conditions associated with motivation for school learning and to describe their management.

CONTENTS

		Page
	Abstract	vii
I	Rationale and Procedure	1
	Subjects	1
	Treatments	1
	Procedures	1
II	Results and Discussion	3
	Discussion	3
III	Summary	5

LIST OF GRAPHS

Graph		Page
1	Mean Acquisition Scores	3
2	Mean Posttest Scores	4
3	Mean Attitude Change Scores	4

ABSTRACT

The purpose of this experiment was to study the influence of increased home-school contact on children's performance and attitudes in mathematics. Both the single and combined effects of frequent parent-teacher conferences and of homework were studied.

Ss were 83 second-grade students from three arithmetic classes representing High, Medium, and Low achievers. Within each achievement level group, Ss were randomly assigned to one of three experimental groups (Conference-Homework, Conference, Homework) or to a Control Group. Parents of Ss in the Conference-Homework group participated in parent-teacher conferences every other week for 12 weeks and received homework assignments for the Ss. Parents of Ss in the Conference group attended similar conferences but were not given homework for the Ss. Ss in the Homework group received homework assignments; their parents did not attend conferences.

The dependent variables were acquisition scores (measured by performance in mathematics during the 12 weeks), posttest scores (scores on an arithmetic achievement test administered at the conclusion of the experiment), and attitude change scores (difference scores between pre- and post-test administration of an attitude preference test).

Three analyses of variance were performed. The effects of the achievement, homework, and conference factors and their interactions were evaluated separately for each dependent variable. In the analysis of acquisition scores, only achievement level was significant ($p < .001$). No particular treatment was consistently superior with regard to acquisition scores. The significant effect of achievement level was also observed in the analysis of posttest scores. Of more interest was the significance ($p < .054$) of the interaction of homework and achievement. Homework facilitated performance of low- and average-achieving Ss on the posttest, whereas it had the opposite effect on high-achieving Ss. In the analysis of attitude change, the only effects found significant were those attributable to conferences ($p < .014$) and the interaction of conferences and achievement levels ($p < .059$). High-achieving Ss showed a strong negative change in attitude, average-achieving Ss a somewhat less negative change, and low-achieving Ss a slight positive change.

I

RATIONALE AND PROCEDURE

The influence of increased home-school contact on children's motivation for learning mathematics was investigated in an experiment carried on by the staff of Instruction and Research Unit B (Grades 1 and 2) at Stephen Bull School, Racine, Wisconsin, during the 1967-68 school year. Miss Patricia Hansen, unit leader, and the three second-grade teachers (Miss Annette Barnes, Mrs. Ruth Miller, and Miss Jessie Rendall) hoped to demonstrate that frequent conferences with parents relative to their children's progress in mathematics would have positive effects on the children's achievement in and attitude toward mathematics. In addition, the unit staff attempted to determine if homework assignments would improve children's performance in mathematics.

SUBJECTS

The subjects were the 83 second-grade pupils from Stephen Bull School, Racine, Wisconsin. The school is located in a disadvantaged area and 85.5% of the subjects were non-white. The subjects ranged in age from 6.6 to 9.1 years with a mean age of 7.8 years. The IQ range was 71 to 137 with a mean IQ of 101.9.

TREATMENTS

Of interest were the effects of conferences and homework, both singly and jointly, on arithmetic performance. The presence and absence of each condition presented four treatment conditions, as follows:

(1) Conference-homework. One parent of each pupil in this treatment was asked to visit school for an individual conference with his child's arithmetic teacher every other week for the 12-week period of the experiment. The parent was given a progress report based on the child's accomplishments in arithmetic as recorded in individual progress folders. The child's arithmetic homework assignments and directions for administering them were given to the parent who was also asked to look over the completed work with the child and return it at the next conference. The homework assignments were a direct outgrowth of ongoing classroom instruction and therefore varied according to achievement level. The assignments centered about drill and practice work rather than enrichment activities.

(2) Conference. Parents of pupils in this treatment attended similar individual conferences. No homework assignments were issued in conjunction with the conferences or at any time during the course of the experiment.

(3) Homework. Identical homework to that used for each achievement level in the first treatment was assigned to pupils in this treatment. No parent-teacher conferences were held nor was any particular effort made to inform parents of the purpose and/or use of the homework.

(4) Control. The pupils in this group received no homework in arithmetic during the course of the experiment and their parents did not attend conferences.

PROCEDURES

All second-grade pupils had been previously separated into three groups for arithmetic instruction on the basis of teacher judgment and of achievement levels, as indicated by performance recorded in the previous year's progress folder. Within each achievement group, pupils were randomly assigned to one of the four treatment groups for the 12-week duration of the experiment.

Each of the three teachers was responsible for all instruction, homework assignments, and parent conferences for the pupils at one achievement level.

All children used the Silver-Burdett arithmetic series for Grade 2, Modern Arithmetic Through Discovery. The number and difficulty of arithmetic concepts covered, as well as the kind and amount of homework given, varied according to achievement level. Every pupil was also given an arithmetic progress folder, developed by Dr. John LeBlanc, Mathematics Consultant for the Racine Public Schools, in which all concepts and skills were listed. Acquisition of a concept or skill was defined as achieving a perfect score on the relevant test. After the pupil attained a perfect score, he colored in a square in his folder indicating mastery of the concept or skill. The folders and tests were used as a basis for discussion in the two treatments involving parent-teacher conferences.

The parents involved were asked to attend a 10-minute conference every other week for a total of six visits. The content of the conferences was described in the treatment section.

II
RESULTS AND DISCUSSION

The data gathered included scores from the posttest, constructed to assess retention of the concepts listed in the individual record folder, and a count (acquisition scores) of the total number of squares each child had colored in his folder during the experimental period. The Adapted Activity Preference Test designed to measure children's attitudes toward mathematics was administered both pre- and post-experiment. Thus in all there were three dependent variables.

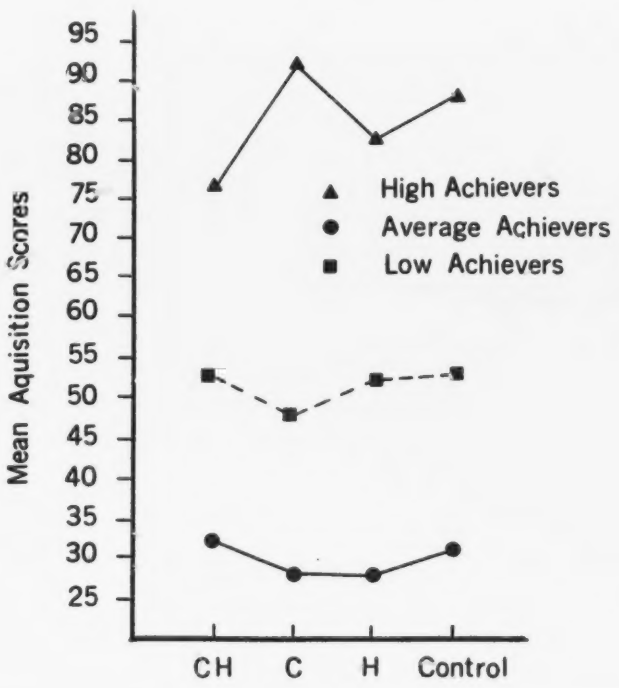
Despite repeated invitations by the unit staff, 11 parents attended only one or two conferences and four parents attended no conference. The remaining 21 parents completed three or more visits; however, the average number of conferences was only 3.1 per parent.

It should be noted that the teacher of the average achievement group joined the unit staff just as the experiment commenced; in the preceding weeks this group had had a succession of substitute teachers. This situation may well have influenced the acquisition and posttest scores of the average achievement group.

DISCUSSION

Three analyses of variance were performed on the data gathered. The effects of the achievement, homework, and conference factors as well as their interactions were thus evaluated separately for each dependent variable.

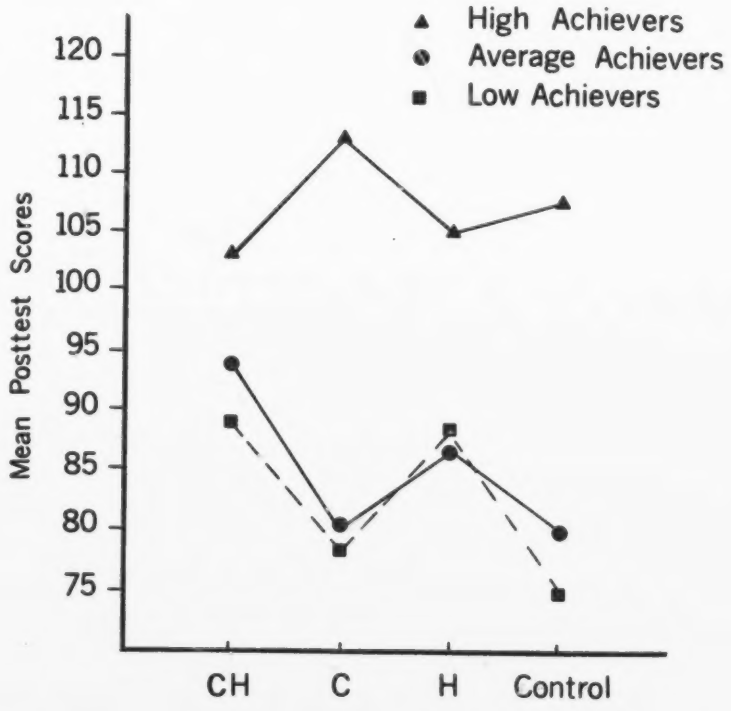
In the analysis of number of concepts acquired, only achievement level was significant ($p < .001$). Not surprisingly, the high achieving students acquired the greatest number of concepts during the course of the experiment. This was true, no matter to which treatment group they had been assigned. However, low achievers outperformed average achievers on this criterion. This result may be attributed to differences in the opportunities presented by the teacher for students to demonstrate mastery of concepts or to differential paces in presentation of material. The large differences in acquisition scores between the three achievement groups are illustrated in Graph 1. It is also evident that no particular treatment was consistently superior to other treatments with regard to the number of concepts acquired.



Graph 1: Mean acquisition scores over treatment groups as a function of achievement level.

The analysis of posttest scores also revealed the significance of achievement levels. However, while the high achievers consistently had the highest scores, Graph 2 indicates that the low- and average-achieving groups performed at approximately the same level. It may well be that the low achievers made sufficiently great progress during the course of the study that any previously existing gap between them and the average achievers was

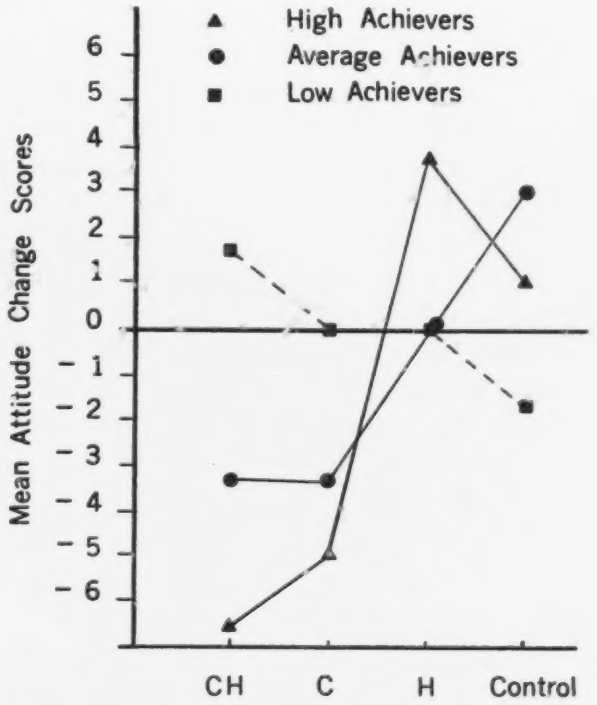
narrowed. Support for such an interpretation is given by the higher acquisition scores attained by the low achievers.



Graph 2: Mean posttest scores over treatment groups as a function of achievement level.

Noticeable also from Graph 2 is the differential effect of homework on pupils of differing achievement levels. In fact, the interaction of homework and achievement level was significant ($p < .054$). Apparently homework facilitated performance of low and average achievers on the posttest, whereas it had the opposite effect on high achievers. Considering the deemphasis that drill has undergone in the new math, one may interpret these results as suggesting the need for more practice on the part of slower learners. High achievers, on the other hand, seem not to need the additional practice afforded by homework.

The only effects found significant in the analysis of attitude change scores were those attributable to conferences ($p < .014$) and the interaction of conferences and achievement levels ($p < .059$). The attitude change of pupils whose parents attended conferences was inversely related to the standing of groups in the class. That is, high achievers showed a strong negative change in attitude, average achievers a somewhat less negative change, and low achievers a slight positive change. Of the children not assigned to the conference procedure, attitude change was positive for high and average achievers, and slightly negative for low achievers. In Graph 3 means for each achievement level-treatment group are presented. Perhaps children who have not experienced difficulty in school work viewed the attendance of their parents at special conferences with undue concern. Pressure at home might also have diminished the liking of these children for arithmetic. However, the confounding of a single teacher with each achievement level limits these tentative conclusions. The negative effects of conferences on these children might in the future be averted by carefully thought-out explanations to experimental pupils and parents alike, reiterated when necessary.



Graph 3: Mean attitude change scores over treatment groups as a function of achievement level.

III
SUMMARY

Second-grade pupils in Stephen Bull School in Racine, Wisconsin, participated in an experiment designed to study the effects of homework and parent conferences on pupil performance in mathematics. The three dependent measures used to assess the effects of the experimental manipulations were:

- -number of mathematical concepts acquired during the experiment
- -score on a mathematics achievement test sampling the content presented during the course of the experiment
- -change score on an instrument assessing attitude toward mathematics class administered before and after the experiment

The results failed to show any difference in acquisition of concepts attributable to either homework or conferences. However, the significant interaction between the homework and achievement grouping variables indicates that homework assignments had a beneficial effect on low and average achievers' performance on the achievement test. Apparently, the additional practice afforded by homework is reflected in improved performance for these children while higher achievers do not need such practice.

Children's attitudes were found to be affected by conferences, but not by homework. Again, a significant interaction indicated that the direction of the effect was related to achievement grouping. Low-achieving pupils were positively affected by the conferences whereas average- and high-achieving pupils were oppositely affected.